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GUN-SHOT WOUNDS

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Gun-Shot Wounds

A Subject like this, which has been made almost a Speciality by some of the most learned and experienced Surgeons of the World, presents comparatively few conditions on which a mere student of medicine can hope to enlighten the masters of the profession,

I propose to present in this paper a few interesting cases that have come under my own observation.

Gun-shot wounds may be described as solutions of continuity of any tissue caused by any missile projected by the Explosive force of gun-powder, whether round ball, minié, small shot, solid shot, grape, canister, spherical case, or shell.

Wounds from the round ball and minié are the only ones that pre-

sent any distinguishing peculiarity, the wounds made by the other missiles mentioned, generally partaking of the nature of contused and lacerated wounds.

The immediate effect of these wounds upon the system is in direct proportion to the vitality of the organ injured, the extent of laceration, or the severity of the shock to the nervous system.

The point of entrance of a round ball, that has approached at a low rate of velocity, is generally small and the edges are depressed; the point of exit is larger and punting; if it has entered at a high rate of velocity, the depression at point of entrance is not so great and the point of exit is considerably lacerated, irregular, but not punting.

In wounds from a minié or elongated ball, there is commonly an oval or oblong opening at point of entrance, without any depression of the edges, while the point of exit is larger

and ragged; in both cases, if no large vessels are cut, there will be a slight oozing of blood from the point of exit.

Balls, wether round or elongated, are very erratic in their motions, a very slight obstruction being sufficient to deflect them from their courses, ~. a case in point is that of a private of Co. D. 26th Pa. Inf'y, who was shot by his own Colonel for disobedience; the ball entered over the Anterior superior spinous process of the ilium of right side, from which it was deflected and continued its course around the body - over the sacrum and passed out over the crest of the ilium of left side ÷ The surgeon was under the impression that the ball had passed completely through the body, but in the course of an hour the track of the ball could be traced by a blue line, caused by extravasation of blood into the wound. This case was peculiar from the fact of its showing the effect the mind may

have in the cure of injuries - as soon as he found he was wounded, he immediately broke out in a cold perspiration and showed signs of the most extreme fear and prostration, which continued until he was assured positively that there was no danger of it proving fatal, when he immediately rallied and in half an hour was limping along, with the aid of a stick, quite merrily. Here I think is the great secret of the extreme fatality of such wounds among raw recruits; the very idea of a wound has a depressing and horrifying effect, while old veterans being more accustomed to the sight of blood and wounds, take it more coolly and as a matter of course, make the most of a bad bargain, rally quicker and consequently a less proportion die.

Another case showing the erratic nature of the minié occured in my own company; Sergeant M. was leading a

charge and was standing in his stirrups, cheering us on, when he received a glance ball from the pommel of his saddle; it entered the left thigh just below the groin - striking the inner side of femur from which it was reflected to the ischium and from that point was reflected in such a way as to turn it almost backward on its course, passing out through the left testicle and cutting the left side of the penis and finally dropping into his boot. The Sergt was sent to the hospital and in three months was sufficiently recovered to rejoin his company.

One of the commonest causes of inconvenience and delay, and consequently, danger, in the cure of gun-shot wounds, is the presence of foreign bodies, as spicula of bone, shreds of cloth, pieces of leather, buttons, or pieces of the ball detached by its coming in contact with some sharp process or projection of the

bone. I remember a curious case where death was caused by a button. A sergeant, belonging to a New York regiment, was admitted to the hospital, from the Chancellorville field, with a gun-shot wound of the chest -; On examining the patient an opening, about three-quarters of an inch in diameter, was found through the middle of the sternum, from which a sanguineous serum was slowly oozing and at every expiration there would be a gush of the same fluid from the wound - he was unconscious, pulse weak and unfrequent - respiration slow, weak and gasping; he sank rapidly and died in eight hours after his admission, apparantly of anemia. On examination post mortem no ball was found but directly under the sternum was found the bright ring of a staff button and on searching further, the body of the button was found lying against the ribs of the right side - On

examining his blouse, the buttons were found to be of the same kind and the second from the top was missing, while it was evident from the appearance that it had been forcibly torn off - and driven through the sternum by a ball striking it in an oblique direction.

Another case, showing the effect that a foreign body may have in preventing the healing of a wound and yet cause no serious inconvenience, was that of Sergeant Baughman of the 148th Pa. Inf'y - Wounded on the eighth day of May 1864, he came under my notice in July of the same year; the foot was swollen, cold and blue and discharging unhealthy looking pus from an opening behind the tuberosity of the fifth metatarsal bone, while the other opening under the external malleolus was partially filled with unhealthy granulations, bleeding free-

ly on the slightest touch; these would break down every few days and permit a small quantity of unclean pus to escape. The general health of the patient was very good and he got quite fat, but there was a perceptible difference in the size of the two legs, that of the injured side being much the smaller.

The Liquor potassa-manq.(per) was freely applied to excite healthy(?) action, but in spite of it the wound continued in this condition until the early part of October, when a shred of stocking cloth about an inch square was discharged and the wound immediately commenced to heal. In searching for foreign bodies, they will generally be found near the point of exit

The bullet may be carried for a long time without inconvenience or danger.

A soldier of the 99th Pa. Inf'try has had a ball imbedded in the substance of the su-

perior maxilla ever since the Battle of Spottsylvania: I know also of a Maine soldier who has had a ball imbedded in the muscular tissue of the thigh ever since the capture of New Orleans early in 1862. Neither of these men suffer any particular inconvenience from their unwelcome visitors; Doctor Scott, however, mentions the case of a friend of his who has a musket ball in the antrum Highmorianum and every time he moves his head suddenly, it rattles about but otherwise it causes no inconvenience (?)

The ball in such cases generally becomes encysted.

While in the army my attention was frequently called to the great proportion of wounds that occur in the upper extremities; this has been ascribed to the prevalence of the Zouave drill in which the soldier lies on his back to load thus exposing his hands and arms.— In my

humble opinion this does not fully account for the fact. My reasons for not accepting the explanation referred to, are

1st. Our soldiers do not generally lie down to load.

2d. If they did, the preponderance of the wounds would be in the right arm, that being the most exposed in loading while lying on the back.- On the contrary the preponderance is in favor of the left arm.

My theory is based on the exposure of the left side of the body, left arm and shoulder both in loading and in firing. In loading he half faces to the right with the musket perpendicular before him the stock resting between his feet and the left hand grasping it near the muzzle the elbow pressed close to the side; In firing the left hand advanced to support the rifle, the

right hand grasping the stock, with the elbow pressed close to the side, the left side of body thrown forwards, the left foot and leg advanced covering the right leg and supporting the body.

This all shows that the left side of the body, left arm and left leg are most exposed to injury and observation has proved the correctness of my deductions, as the following table will partly show.

No. of Wounds of the Upper Extremities	No. of Wounds of Left Arm	No of Wounds of Right Arm	How Received			
			Left Arm		Right Arm	
			Loading	Firing	Loading	Firing
49	37	12	2	35	7	5

In loading the right arm is momentarily exposed while drawing and returning rammer.

But this only explains the preponderance of wounds in the left arm, while the original question, Why are the upper extremities more liable to injury from gun-shot than any other portion of the body? remains unanswered. This can, I think, be explained on rational grounds, without the necessity of throwing whole armies broad on their backs, to soil their nice uniforms, for the purpose of explaining a simple problem.

Every soldier knows, or ought to know, that in a pitched battle the firing is generally within point blank range, say inside of one hundred yards, now the tendency is strong to fire at the instant the musket gets on a level with the eye, thus bringing it to bear on or about the breast of the enemy which is covered almost completely by his upper extremities, assisted by his musket if he happens to be in the act of fir-

ing. and if he happens to be loading, his left arm presents and is apt to receive the shot.

Now, taking into consideration, that during a battle, those who are directly engaged are at all times performing either one or the other of these operations, it can be easily seen why the upper extremities should receive more injuries than any other part.

Severe shocks to the nervous system occur when large joints are the seats of injury & these have generally proved fatal, if amputation or excision of the joint had not been resorted to primarily; death being caused either by the extension of suppuration or the supervention of tetanus, which latter, as far as my observation extends (some 5 or 6 cases) is more liable to occur from injuries to the Knee joint than from any other source; a predisposing cause seems to have been exposure to rapid and violent changes of tem-

perature, for instance, it was frightfully common among the wounded of the Second Bull Run, who lay exposed to heavy and cold night dews and hot sun for three or four consecutive nights and days

I remember a case of pyemia, the only well marked one that I ever saw, that occured after a gun-shot wound in the Knee. A Union French Soldier was wounded at Antietam + and admitted to No 4. Hospital at Frederick City. On the 3d day after his admission he was attacked by rigors which the surgeon mistook for the chills of intermittent fever a commenced to dose him with Quinine, the panacea of Allopaths, The rigors continued until the 5th day the wound still discharging freely but on the 6th day the discharge ceased, the skin became hot, breath foul, face pale and anxious looking erythematic blotches

appeared on various parts of the body; he continued thus until the 15th day when the skin began to feel doughy, his eyes became dull and he discharged considerable pus with his urine which was voided with much pain. and was mixed with oil globules, indicating formation of abscesses in the bladder, his pulse became small and weak, tongue teeth and lips became covered with a brown crust, abscesses formed in various parts of the body, especially in region of the joints, the pain on voiding urine became excruciating, he would ~~grit~~ grate his teeth; he gradually became comatose but was frequently awakened by the violence of the pain, diarrhoea with involuntary stool set in and on the 16th day he died evidently of destructive suppuration of the soft tissue. I think his death was hastened by the large quantities of Morphia that was given to him, one-

half of a grain every four hours during the last two days of his life, to my certain knowlege, how much more his nurse may have crammed down his throat to help along the cause of Science, I have no means of knowing.

Secondary hæmorrhage is apt to occur from sloughing away of the tissue embracing an artery and consequent softening of the coats of the vessel; this very fact makes it more to be dreaded as it is impossible to apply a ligature at the seat of hæmorrhage.

It may also occur after amputations and does, in fact, more frequently than in other case, from the sloughing away of ligatures before the coagula are formed. The greatest danger appeared to be between the tenth and twentieth days

Sometimes Gun-shot wounds are complicated with fracture in such cases being either Compound, Comminuted or

complicated.

1st The compound variety; all simple solutions of continuity of bone from a blow by a ball after passing through the soft tissues enveloping the bone,

2d In the comminuted variety the ends or edges of the bone are broken into several fragments; this variety is generally compound also.

3d In the complicated variety there is some viscera or important vessel or Organ injured by the fragments of the bone or by the same missile that caused the fracture or both -

The treatment of compound fractures is to get the broken fragments into coaptation and convert it into a simple fracture by healing the external wound.

The difficulty in the treatment of the comminuted fractures is to get rid of the small fragments and minute spicula of

bone without extensive suppuration, the wound may heal up at the surface and these fragments keep up an irritation and the pus being unable to reach the surface by the original wound will burrow among the soft tissue and finally reach the surface by several fistulous openings. A private of the 1st N.J. Cavalry received a gunshot fracture of the tibia just below the anterior tubercle, on examination several fragments of bone were found and removed, a Smith's anterior splint applied. In a few days suppuration set in and continued about four weeks when after probing the wound and finding no foreign body present, the surgeon made an attempt to heal it up in which he unfortunately succeeded; at the end of a week the patient complained of great pain from the knee to the groin with swelling of the inguinal glands; Volatile

liniment was given to attract the irritation to the surface, a kind of moral suasion that does not work well however nicely it may sound, at any rate it did not succeed in this case for the next day the limb was swollen and painful for some distance above and below the knee. the Volatile liniment was discontinued and cold water applied; after a few days fluctuation could be distinctly felt below the knee, the wound reopened and discharged a small quantity of unhealthy looking pus and almost simultaneously two more openings appeared one on each side of the patella; In a few days the discharge became thin and watery and filled with floating specks of oily matter, supposed to proceed from the breaking down of the adipose tissue of the joint. At this juncture a consultation was held and amputation decided upon; the operation

was performed but the patient subsequently died of secondary hæmorrhage from softening of the coats of the arteries. On Examining the bones of the amputated limb no signs of an attempt at union could be perceived and several small fragments ~~were~~ were found detached from the bone, but still attached to fibres of the ligamentum patellæ; there can be no doubt that these were the exciting cause; the predisposing cause being some taint or extreme irritability of the system.

In the complicated variety, the danger is in proportion to the importance of the Organ or tissue involved or its susceptibility to inflammatory action. The most important organs liable to complication are the brain, lungs, abdominal viscera and the large arteries; I should perhaps have mentioned the heart as the most important but as injuries to it are generally immediately fatal, it would be superfluous to

say any thing about it. As my own case is interesting in this connection, I will briefly describe it.

I was wounded on May 7th 1864. the ball striking about one half of an inch in front of the coronal suture, in the median line of the skull, extensively comminuting the external plate and depressing a small fragment of the internal plate and passing out about two and a half inches further back

I was completely stunned by the shock and was carried to the hospital where I revived. Several detached fragments were taken from the wound, but sometime during the night I became unconscious. The next thing that I remember was finding myself in bed in the Washington House, Fredericksburg with a doctor dressing my head, having a few hours before removed the depressed portion of the skull, a piece about three quarter of an inch long

and about a line and a half in width. I could see nothing beyond four or five feet; vision became gradually more distinct but diplopia took its place. I have no doubt that this existed from the commencement but the extreme dimness of vision prevented its development. About the 28th I was sent to Alexandria where I remained, slowly improving, about ten days and was again sent off, this time to Philadelphia. At this time the wound was freely suppurating and the diplopia was, if anything, worse. About the middle of July the wound began to fill with unhealthy granulations and I began to fear the presence of a foreign body and mentioned my fears to the surgeon, he called me a "fool" and asked me what I knew of Surgery: I told him if he was a surgeon I knew nothing about it; and was therefore in bad odor with him for some time and consequently received very little attention, for which I was.

profoundly grateful, as I thereby escaped the application of lunar caustic.

In a few days I received a furlough and had only been at home a few hours, when I detected the sharp point of a spicula of bone protruding from the surface of the wound; I extracted it and during the following two months as many as a dozen other pieces, varying in size from a small grain of wheat to a "Beverly bean", were discharged, while ~~adhering to the dressing~~ at a later period, were small particles of bone extremely small adhering to the dressing. After the first piece of bone was discharged the double vision began to leave and by the middle of October I could see very well, and now the only trouble I Experience is inability to read by gas-light, the words all running together. It is evident that the derangement of vision was owing to some disturbance of the fibres of the optic nerve at

its decussation, by the primary shock, while it was kept up by the irritation at the wound; which I infer from the fact of its gradually disappearing, with the removal of the irritating agent.

In the treatment of wounds by our friends of the old school there is great room for improvement. The course usually adopted, is, if the wound is comparatively fresh and the patient is exhausted by hæmorrhage or depressed by the shock, to give him a dose of alcoholic stimulus, either brandy or whiskey, or in the absence of this a few drops of liquor ammonia in a glass of water and, if a simple wound, dress it by the application of a pledget of lint steeped in cold water. I have nothing to urge against the cold water treatment, but against the inordinate stimulation I protest with all my power, having seen the most fearful effects follow it, but unfortunately the surgeons

who follow that treatment are deprived of the privilege of witnessing its after effects by the patient almost immediately passing out of their hands or else, I am constrained to believe they would stop their pernicious practice. What a pity it is that our Surgeons Know so little about the admirable properties of the attenuations of Arnica, Rhus, Calendula &c in severe wounds. if they alone were introduced into the army practice, I have no doubt that they would be the means of saving hundreds of lives.

The cold water is continued if the progress is favorable until the wound has healed, but if granulations are thrown out too profusely when the cicatrix is forming, what is called the mild cautery is resorted to, Viz: Nitrate of Silver, to remove the redundant granulations, thus producing delay and generally, liability of the wound to break out again. If gangrene threatens, the application of Strong nitric acid is resorted to, or

bromine, the strongest caustic in use, is applied.

That they are able to arrest the progress of this fatal disease by these powerful agents, I will not deny, but that more mischief than good is done, in the majority of cases, is my earnest belief. A patient with a gun shot wound in left thigh in which gangrene appeared had bromine applied, but it was done so carelessly that more of it ran down his nates & on his back than went into his wound; the gangrene disappeared but the ulcers, formed on the sound skin by the bromine, sloughed to such an extent as to cause death in ten days.

The treatment of fractures usually adopted is, in case of injury to a joint or in region of a joint, excision of the joint or of the terminal extremity of one of the bones entering into the formation of it.

If the fracture is of the shaft of a long bone and comminuted, resection of the broken ends

is resorted to.

In fractures of long bones without comminution, the broken ends are brought into as close coaptation as possible and a Smith's Anterior Splint applied. These Splints, being composed of heavy wire, are so flexible as to be easily fitted to the limb and are usually applied to the limb flexed and confined by a roller, the open wound not being covered in by the folds, this enabling the surgeon to dress the wound without disturbing the limb. The limb is then suspended by a cord and hooks from the ceiling.

For fractures of the bones of arm, Bond's Splint and a Splint similar to Ahl's are extensively used and with good success.

R. W. Martin

Philad^{a} Jany 30th 1864